

**Land to the west of New Barn Lane,
North Bersted
West Sussex**

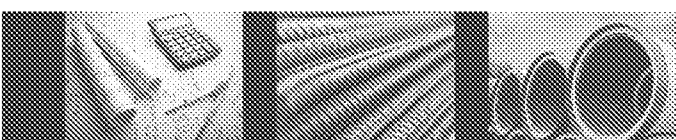
Foul & Surface Water Statement

KTG/18:0047B/5529
7th February 2019

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- 1.1 Linden Homes is seeking planning permission for the development of 37,200m² (3.72ha) of greenfield land located at New Barn Lane, North Bersted, Bognor Regis. The site is centred on National Grid Reference SU 91570 01054.
- 1.2 MJA Consulting has been appointed to prepare a suitable strategy for the disposal of surface and foul water from the proposed development incorporating the principles of Sustainable Drainage Systems (SuDS) and in accordance with Environment Agency guidance, The Building Regulations (Document H 2002) and The National Planning Policy Framework (NPPF).

Surface Water

- 2.1 The National Planning Policy Framework (NPPF) requires that developments do not exacerbate flood risks both to the development site and to offsite parties and land, which means there is a need to manage surface water to ensure there are no increases in peak rates and volumes of runoff as a result of the development.
- 2.2 Environment Agency guidance and government legislation such as the Flood and Water Management Act (Defra 2010) requires surface water drainage strategies for new developments to be in accordance with the ideals of 'sustainable development' via the provision of Sustainable Drainage Systems (SuDS).
- 2.3 The Building Regulations Document H (2015) and The SuDS Manual CIRIA 753 (2015) details the appropriate hierarchy of potential methods for disposing of surface water from a development:
1. A soakaway or some other adequate infiltration system, or where that is not practicable;
 2. A watercourse, or where that is not practicable;
 3. A sewer.
- 2.4 Information published by the British Geological Society (BGS) indicates that the site is anticipated to be directly underlain by the River Terrace Deposits (sand, silt and clays) overlying the Lewis Nodular Chalk Formation (chalk).



- 2.5 Onsite soakage tests using the BRE Digest 365 methodology showed the minimum infiltration rate to be 1×10^{-6} m/s. This is a very poor rate and therefore infiltration SuDs are deemed unsuitable to manage the storm water run-off from the proposed on site development.
- 2.6 It is proposed that surface water runoff from roofs, driveways and roads will be collected by a conventional system of guttering, downpipes and drains where it will be discharged via a surface water pipe network to either an attenuation basin/swale or attenuation tank.
- 2.7 Surface water flows will be attenuated on site with a restricted discharge rate of circa 13 l/s to match the existing greenfield rate. There will be two discharge points taking surface water offsite: The attenuation tank to the north will discharge at 3 l/s to an existing watercourse; and the attenuation tank to the south will discharge to a Southern Water existing sewer in New Barn Lane at 10 l/s. The storm water attenuated in the tank to the south will first pass through an attenuation basin/swale which will discharge water to the attenuation tank at 2 l/s.
- 2.8 All SUDS are sized to manage the 1 in 100year (1% AEP) storm event, plus an extra allowance of 40% for the predicted potential increase in peak rainfall up to 2115.
- 2.9 The proposed surface water drainage strategy offers a sustainable, safe and robust system which will afford complete flood risk protection to the new property and to existing properties and land within adjacent to the site. This is achieved by attenuating all additional runoff from impermeable surfaces, incorporating the principles of a Sustainable Drainage System (SuDS). This strategy ensures that the peak rate and volume of surface water runoff will be no greater than the existing runoff rate for the site for all rainfall events up to the 100 year +40% rainfall event.
- 2.10 The procedure for surface water management in accordance within 'Rainfall runoff management for developments' (DEFRA/EA Report – SC030219 E, 2013) states;
For the range of annual flow rate probabilities up to and including the 1% (1 in 100 year) annual exceedance probability event including an appropriate allowance for climate change, the post-developed rate and volume of run-off into a watercourse, sewer, or other receiving water body, should be no greater than the existing pre-developed rate of run-off for the same event.

Foul Water

- 3.1 The foul water discharge from the development will drain via gravity to an existing public sewer system located beyond the east of the site boundary, within New Barn Lane. Within the site boundary there is a pumping station which will serve a number of the properties in order to connect to the foul drainage network.
- 3.2 The development foul water network will remain private onsite. Section F4-F1 will be offered to Southern Water for adoption under a Section 104 agreement of the Water Industry Act 1991.
- 3.3 Southern Water will be consulted to ensure adequate capacity and determine a suitable point of connection with the existing foul sewer. If required, upgrading works will be carried out to the existing network to enable the proposed connection.
- 3.4 This will ensure that the proposed development has a 'no detriment' impact on the foul sewer system within the village of North Bersted and does not create a flood risk.
- 3.5 The predicted peak foul sewer discharge from the proposed properties to the existing foul sewer based on the Sewers for Adoption 7th figure (4000 l/dwelling/day) will be 4.6 l/s.

Statement prepared by

Karl T Gebhart
FOR MJA CONSULTING



Appendix A
Surface Water Attenuation Calculations

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MJA Consulting		Page 1
Monarch House Barton Lane OX14 3NB	New Barn Lane, N.Bersted Surface Water Network 99 Unit Scheme	
Date 20/02/2019 File 99 UNIT SCHEME +10%.MDX	Designed by S.Smith Checked by	
Innovyze	Network 2017.1.2	

Time Area Diagram for Storm at outfall SOUT1 (pipe S1.010)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.181	4-8	0.301	8-12	0.006

Total Area Contributing (ha) = 0.488

Total Pipe Volume (m³) = 27.813

Time Area Diagram at outfall SSWMH (pipe S4.015)

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
0-4	0.129	4-8	0.740	8-12	0.128

Total Area Contributing (ha) = 0.997

Total Pipe Volume (m³) = 60.538

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Existing Network Details for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type
S1.000	14.272	0.098	145.6	0.037	5.00	0.0	0.600	o	225	Pipe/Conduit
S1.001	11.982	0.070	171.2	0.006	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.002	8.715	0.051	170.9	0.028	0.00	0.0	0.600	o	225	Pipe/Conduit
S1.003	33.571	0.134	250.5	0.026	0.00	0.0	0.600	o	300	Pipe/Conduit
S1.004	34.121	0.136	250.9	0.097	0.00	0.0	0.600	o	300	Pipe/Conduit
S2.000	16.790	0.101	166.2	0.096	5.00	0.0	0.600	o	225	Pipe/Conduit
S1.005	15.204	0.051	298.1	0.068	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.006	24.037	0.080	300.5	0.033	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.007	20.564	0.069	298.0	0.056	0.00	0.0	0.600	o	375	Pipe/Conduit
S3.000	11.124	0.160	69.5	0.041	5.00	0.0	0.600	[]	1	Pipe/Conduit
S1.008	39.685	0.090	440.9	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.009	20.096	0.055	365.4	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit
S1.010	2.455	0.025	98.2	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit
S4.000	12.033	0.070	171.9	0.055	5.00	0.0	0.600	o	225	Pipe/Conduit
S4.001	36.708	0.146	251.4	0.015	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.002	35.335	0.142	248.8	0.100	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.003	19.513	0.078	250.2	0.058	0.00	0.0	0.600	o	300	Pipe/Conduit

Network Results Table

PN	US/IL (m)	I.Area (ha)	Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S1.000	3.659	0.037	0.0	1.08	43.0
S1.001	3.561	0.043	0.0	1.00	39.6
S1.002	3.491	0.071	0.0	1.00	39.7
S1.003	3.365	0.097	0.0	0.99	69.9
S1.004	3.231	0.194	0.0	0.99	69.8
S2.000	3.271	0.096	0.0	1.01	40.2
S1.005	3.020	0.358	0.0	1.04	115.3
S1.006	2.969	0.391	0.0	1.04	114.9
S1.007	2.889	0.447	0.0	1.04	115.3
S3.000	2.980	0.041	0.0	3.59	2470.8
S1.008	2.820	0.488	0.0	0.86	94.6
S1.009	2.730	0.488	0.0	0.94	104.0
S1.010	2.625	0.488	0.0	1.32	52.5
S4.000	4.250	0.055	0.0	0.99	39.5
S4.001	4.105	0.070	0.0	0.99	69.8
S4.002	3.959	0.170	0.0	0.99	70.1
S4.003	3.817	0.228	0.0	0.99	69.9

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S5.000	26.630	0.156	170.7	0.019	5.00	0.0	0.600	o	225	Pipe/Conduit	
S4.004	4.522	0.016	282.6	0.056	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.005	3.972	0.016	248.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.006	50.847	0.160	317.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.007	11.458	0.171	67.0	0.080	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.008	47.559	0.226	210.4	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S4.009	18.888	0.180	104.9	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.000	17.925	0.105	170.7	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	
S6.001	51.183	0.204	250.9	0.090	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.002	30.537	0.118	258.8	0.077	0.00	0.0	0.600	o	300	Pipe/Conduit	
S7.000	42.349	0.250	169.4	0.090	5.00	0.0	0.600	o	225	Pipe/Conduit	
S6.003	40.263	0.161	250.1	0.139	0.00	0.0	0.600	o	300	Pipe/Conduit	
S6.004	4.642	0.027	171.9	0.132	0.00	0.0	0.600	o	300	Pipe/Conduit	
S8.000	8.367	0.052	160.9	0.009	5.00	0.0	0.600	o	225	Pipe/Conduit	
S8.001	19.737	0.103	191.6	0.027	0.00	0.0	0.600	o	225	Pipe/Conduit	
<u>Network Results Table</u>											
PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)						
S5.000	3.370	0.019	0.0	1.00	39.7						
S4.004	3.739	0.303	0.0	0.93	65.8						
S4.005	3.723	0.303	0.0	0.93	70.2						
S4.006	3.707	0.303	0.0	0.88	62.0						
S4.007	3.547	0.383	0.0	1.92	136.0						
S4.008	3.376	0.383	0.0	1.08	76.3						
S4.009	3.150	0.383	0.0	1.53	108.5						
S6.000	4.018	0.050	0.0	1.00	39.7						
S6.001	3.838	0.140	0.0	0.93	69.8						
S6.002	3.634	0.217	0.0	0.97	68.8						
S7.000	3.841	0.090	0.0	1.00	39.8						
S6.003	3.516	0.446	0.0	0.93	70.0						
S6.004	3.355	0.578	0.0	1.20	84.5						
S8.000	3.558	0.009	0.0	1.03	40.9						
S8.001	3.506	0.036	0.0	0.94	37.4						
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S6.005	11.934	0.222	53.8	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S6.006	17.171	0.136	126.3	0.000	0.00	0.0	0.600	[]	1	Pipe/Conduit
S4.010	13.545	0.092	147.2	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.011	15.360	0.082	187.3	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.012	12.303	0.056	219.7	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit
S4.013	17.628	0.050	352.6	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
S4.014	71.169	0.180	395.4	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit
S4.015	4.107	0.010	410.7	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit

Network Results Table

PN	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Vel (m/s)	Cap (l/s)
S6.005	3.328	0.614	0.0	2.15	151.9
S6.006	3.106	0.614	0.0	2.66	1831.2
S4.010	2.870	0.997	0.0	1.29	91.4
S4.011	2.878	0.997	0.0	1.15	81.0
S4.012	2.756	0.997	0.0	1.06	74.7
S4.013	2.580	0.997	0.0	1.08	171.3
S4.014	2.540	0.997	0.0	1.02	161.6
S4.015	2.360	0.997	0.0	1.00	158.6

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PIPELINE SCHEDULES for Storm Upstream Manhole <table><thead><tr><th>PN</th><th>Hyd Sect</th><th>Diam (mm)</th><th>MH Name</th><th>C.Level (m)</th><th>I.Level (m)</th><th>D.Depth (m)</th><th>MH Connection</th><th>MH DIAM., L*W (mm)</th></tr></thead><tbody><tr><td>S1.000</td><td>o</td><td>225</td><td>S24</td><td>5.295</td><td>3.659</td><td>1.321</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.001</td><td>o</td><td>225</td><td>S23</td><td>5.056</td><td>3.561</td><td>1.270</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.002</td><td>o</td><td>225</td><td>S22</td><td>4.989</td><td>3.491</td><td>1.273</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.003</td><td>o</td><td>300</td><td>S21</td><td>4.864</td><td>3.365</td><td>1.199</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.004</td><td>o</td><td>300</td><td>S20</td><td>4.722</td><td>3.231</td><td>1.191</td><td>Open 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Manhole</td><td>1200</td></tr><tr><td>S1.001</td><td>11.982</td><td>171.2</td><td>S22</td><td>4.989</td><td>3.491</td><td>1.273</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.002</td><td>8.715</td><td>170.9</td><td>S21</td><td>4.864</td><td>3.440</td><td>1.199</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.003</td><td>33.571</td><td>250.5</td><td>S20</td><td>4.722</td><td>3.231</td><td>1.191</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.004</td><td>34.121</td><td>250.9</td><td>S19</td><td>4.489</td><td>3.095</td><td>1.094</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S2.000</td><td>16.790</td><td>166.2</td><td>S19</td><td>4.489</td><td>3.170</td><td>1.094</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.005</td><td>15.204</td><td>298.1</td><td>S18</td><td>4.389</td><td>2.969</td><td>1.045</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.006</td><td>24.037</td><td>300.5</td><td>S17</td><td>4.382</td><td>2.889</td><td>1.118</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.007</td><td>20.564</td><td>298.0</td><td>S16</td><td>4.600</td><td>2.820</td><td>1.405</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S3.000</td><td>11.124</td><td>69.5</td><td>S16</td><td>4.600</td><td>2.820</td><td>1.180</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.008</td><td>39.685</td><td>440.9</td><td>S11</td><td>4.600</td><td>2.730</td><td>1.495</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.009</td><td>20.096</td><td>365.4</td><td>SCPM3</td><td>4.600</td><td>2.675</td><td>1.550</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S1.010</td><td>2.455</td><td>98.2</td><td>SOUT1</td><td>4.000</td><td>2.600</td><td>1.175</td><td>Open Manhole</td><td>600</td></tr><tr><td>S4.000</td><td>12.033</td><td>171.9</td><td>S13</td><td>5.410</td><td>4.180</td><td>1.005</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S4.001</td><td>36.708</td><td>251.4</td><td>S12</td><td>5.160</td><td>3.959</td><td>0.901</td><td>Open Manhole</td><td>1200</td></tr><tr><td>S4.002</td><td>35.335</td><td>248.8</td><td>S11</td><td>5.323</td><td>3.817</td><td>1.206</td><td>Open Manhole</td><td>1200</td></tr></tbody></table>				PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	S1.000	o	225	S24	5.295	3.659	1.321	Open Manhole	1200	S1.001	o	225	S23	5.056	3.561	1.270	Open Manhole	1200	S1.002	o	225	S22	4.989	3.491	1.273	Open Manhole	1200	S1.003	o	300	S21	4.864	3.365	1.199	Open Manhole	1200	S1.004	o	300	S20	4.722	3.231	1.191	Open Manhole	1200	S2.000	o	225	S25	4.641	3.271	1.145	Open Manhole	1200	S1.005	o	375	S19	4.489	3.029	1.094	Open Manhole	1200	S1.006	o	375	S18	4.389	2.969	1.045	Open Manhole	1200	S1.007	o	375	S17	4.382	2.889	1.118	Open Manhole	1200	S3.000	[]	1	S10	4.500	2.980	0.920	Open Manhole	1200	S1.008	o	375	S16	4.600	2.820	1.405	Open Manhole	1200	S1.009	o	375	S11	4.600	2.730	1.495	Open Manhole	1200	S1.010	o	225	SCPM3	4.600	2.625	1.750	Open Manhole	1200	S4.000	o	225	S14	5.393	4.250	0.918	Open Manhole	1200	S4.001	o	300	S13	5.410	4.105	1.005	Open Manhole	1200	S4.002	o	300	S12	5.160	3.959	0.901	Open Manhole	1200	PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)	S1.000	14.272	145.6	S23	5.056	3.561	1.270	Open Manhole	1200	S1.001	11.982	171.2	S22	4.989	3.491	1.273	Open Manhole	1200	S1.002	8.715	170.9	S21	4.864	3.440	1.199	Open Manhole	1200	S1.003	33.571	250.5	S20	4.722	3.231	1.191	Open Manhole	1200	S1.004	34.121	250.9	S19	4.489	3.095	1.094	Open Manhole	1200	S2.000	16.790	166.2	S19	4.489	3.170	1.094	Open Manhole	1200	S1.005	15.204	298.1	S18	4.389	2.969	1.045	Open Manhole	1200	S1.006	24.037	300.5	S17	4.382	2.889	1.118	Open Manhole	1200	S1.007	20.564	298.0	S16	4.600	2.820	1.405	Open Manhole	1200	S3.000	11.124	69.5	S16	4.600	2.820	1.180	Open Manhole	1200	S1.008	39.685	440.9	S11	4.600	2.730	1.495	Open Manhole	1200	S1.009	20.096	365.4	SCPM3	4.600	2.675	1.550	Open Manhole	1200	S1.010	2.455	98.2	SOUT1	4.000	2.600	1.175	Open Manhole	600	S4.000	12.033	171.9	S13	5.410	4.180	1.005	Open Manhole	1200	S4.001	36.708	251.4	S12	5.160	3.959	0.901	Open Manhole	1200	S4.002	35.335	248.8	S11	5.323	3.817	1.206	Open Manhole	1200
PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)																																																																																																																																																																																																																																																																																																													
S1.000	o	225	S24	5.295	3.659	1.321	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
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S1.002	o	225	S22	4.989	3.491	1.273	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.003	o	300	S21	4.864	3.365	1.199	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.004	o	300	S20	4.722	3.231	1.191	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S2.000	o	225	S25	4.641	3.271	1.145	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.005	o	375	S19	4.489	3.029	1.094	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.006	o	375	S18	4.389	2.969	1.045	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.007	o	375	S17	4.382	2.889	1.118	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S3.000	[]	1	S10	4.500	2.980	0.920	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.008	o	375	S16	4.600	2.820	1.405	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.009	o	375	S11	4.600	2.730	1.495	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.010	o	225	SCPM3	4.600	2.625	1.750	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S4.000	o	225	S14	5.393	4.250	0.918	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
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PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)																																																																																																																																																																																																																																																																																																													
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S3.000	11.124	69.5	S16	4.600	2.820	1.180	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.008	39.685	440.9	S11	4.600	2.730	1.495	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.009	20.096	365.4	SCPM3	4.600	2.675	1.550	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S1.010	2.455	98.2	SOUT1	4.000	2.600	1.175	Open Manhole	600																																																																																																																																																																																																																																																																																																													
S4.000	12.033	171.9	S13	5.410	4.180	1.005	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
S4.001	36.708	251.4	S12	5.160	3.959	0.901	Open Manhole	1200																																																																																																																																																																																																																																																																																																													
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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S4.003	o	300	S11	5.323	3.817	1.206	Open Manhole	1200
S5.000	o	225	S15	4.950	3.970	0.755	Open Manhole	1200
S4.004	o	300	S10	5.216	3.739	1.177	Open Manhole	1200
S4.005	o	300	S29	5.300	3.723	1.277	Open Manhole	1200
S4.006	o	300	SHW1	5.000	3.707	0.993	Open Manhole	600
S4.007	o	300	SHW2	4.840	3.547	0.993	Open Manhole	600
S4.008	o	300	S31/CPM2	5.150	3.376	1.474	Open Manhole	1250
S4.009	o	300	S9	5.050	3.150	1.600	Open Manhole	1200
S6.000	o	225	S7	5.150	4.018	0.907	Open Manhole	1200
S6.001	o	300	S6	5.039	3.838	0.901	Open Manhole	1200
S6.002	o	300	S5	4.883	3.634	0.949	Open Manhole	1200
S7.000	o	225	S8	5.150	3.841	1.084	Open Manhole	1200
S6.003	o	300	S4	4.781	3.516	0.965	Open Manhole	1200
S6.004	o	300	S3	4.848	3.355	1.193	Open Manhole	1200
S8.000	o	225	S2A	4.546	3.558	0.763	Open Manhole	975 x 675

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S4.003	19.513	250.2	S10	5.216	3.739	1.177	Open Manhole	1200
S5.000	26.630	170.7	S10	5.216	3.814	1.177	Open Manhole	1200
S4.004	4.522	282.6	S29	5.300	3.723	1.277	Open Manhole	1200
S4.005	3.972	248.3	SHW1	5.000	3.707	0.993	Open Manhole	600
S4.006	50.847	317.8	SHW2	4.840	3.547	0.993	Open Manhole	600
S4.007	11.458	67.0	S31/CPM2	5.150	3.376	1.474	Open Manhole	1250
S4.008	47.559	210.4	S9	5.050	3.150	1.600	Open Manhole	1200
S4.009	18.888	104.9	S25	4.900	2.970	1.630	Open Manhole	1200
S6.000	17.925	170.7	S6	5.039	3.913	0.901	Open Manhole	1200
S6.001	51.183	250.9	S5	4.883	3.634	0.949	Open Manhole	1200
S6.002	30.537	258.8	S4	4.781	3.516	0.965	Open Manhole	1200
S7.000	42.349	169.4	S4	4.781	3.591	0.965	Open Manhole	1200
S6.003	40.263	250.1	S3	4.848	3.355	1.193	Open Manhole	1200
S6.004	4.642	171.9	S1	4.934	3.328	1.306	Open Manhole	1200
S8.000	8.367	160.9	S2	4.546	3.506	0.909	Open Manhole	1200

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PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.001	o	225	S2	4.640	3.506	9.909	Open Manhole	1200
S6.005	o	300	S1	4.934	3.328	1.306	Open Manhole	1200
S6.006	[]	1	S32	4.950	3.106	1.244	Open Manhole	1200
S4.010	o	300	S25	4.900	2.970	1.630	Open Manhole	1200
S4.011	o	300	SCPM1	4.700	2.878	1.522	Open Manhole	1200
S4.012	o	300	S26	4.229	2.796	1.133	Open Manhole	1500
S4.013	o	450	S7954	4.250	2.590	1.210	Open Manhole	1200
S4.014	o	450	S27	4.210	2.540	1.220	Open Manhole	1500
S4.015	o	450	S28	3.850	2.360	1.040	Open Manhole	1500

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S8.001	19.737	191.6	S1	4.934	3.403	1.306	Open Manhole	1200
S6.005	11.934	53.8	S32	4.950	3.106	1.544	Open Manhole	1200
S6.006	17.171	126.3	S25	4.900	2.970	1.330	Open Manhole	1200
S4.010	13.545	147.2	SCPM1	4.700	2.878	1.522	Open Manhole	1200
S4.011	15.360	187.3	S26	4.229	2.796	1.133	Open Manhole	1500
S4.012	12.303	219.7	S7954	4.250	2.740	1.210	Open Manhole	1200
S4.013	17.628	352.6	S27	4.210	2.540	1.220	Open Manhole	1500
S4.014	71.169	395.4	S28	3.850	2.360	1.040	Open Manhole	1500
S4.015	4.107	410.7	SSWMH	3.730	2.350	0.930	Open Manhole	1200

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S1.010	SOUT1	4.000	2.600	0.000	600	0
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Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
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S4.015	SSWMH	3.730	2.350	0.000	1200	0
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Online Controls for Storm

Hydro-Brake® Optimum Manhole: SCPM3, DS/PN: S1.010, Volume (m³): 4.3

Unit Reference	MD-SHE-0082-3000-1000-3000
Design Head (m)	1.000
Design Flow (l/s)	3.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	82
Invert Level (m)	2.625
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.000	3.0
Flush-Flo™	0.297	3.0
Kick-Flo®	0.623	2.4
Mean Flow over Head Range	-	2.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.4	1.200	3.3	3.000	5.0	7.000	7.4
0.200	2.9	1.400	3.5	3.500	5.4	7.500	7.7
0.300	3.0	1.600	3.7	4.000	5.7	8.000	7.9
0.400	2.9	1.800	3.9	4.500	6.0	8.500	8.2
0.500	2.8	2.000	4.1	5.000	6.3	9.000	8.4
0.600	2.5	2.200	4.3	5.500	6.6	9.500	8.6
0.800	2.7	2.400	4.5	6.000	6.9		
1.000	3.0	2.600	4.7	6.500	7.2		

Hydro-Brake® Optimum Manhole: S31/CPM2, DS/PN: S4.008, Volume (m³): 2.9

Unit Reference	MD-SHE-0077-2000-0300-2000
Design Head (m)	0.300
Design Flow (l/s)	2.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	77
Invert Level (m)	3.376
Minimum Outlet Pipe Diameter (mm)	100
Suggested Manhole Diameter (mm)	1200

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Hydro-Brake® Optimum Manhole: S31/CPM2, DS/PN: S4.008, Volume (m³): 2.9

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	0.300	2.0
Flush-Flo™	0.113	2.0
Kick-Flo®	0.228	1.8
Mean Flow over Head Range	-	1.6

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	2.0	1.200	3.8	3.000	5.8	7.000	8.8
0.200	1.9	1.400	4.1	3.500	6.2	7.500	9.1
0.300	2.0	1.600	4.3	4.000	6.7	8.000	9.4
0.400	2.3	1.800	4.6	4.500	7.1	8.500	9.7
0.500	2.5	2.000	4.8	5.000	7.4	9.000	10.0
0.600	2.7	2.200	5.0	5.500	7.8	9.500	10.3
0.800	3.1	2.400	5.2	6.000	8.2		
1.000	3.5	2.600	5.4	6.500	8.5		

Hydro-Brake® Optimum Manhole: SCPM1, DS/PN: S4.011, Volume (m³): 2.9

Unit Reference	MD-SHE-0143-1000-1200-1000
Design Head (m)	1.200
Design Flow (l/s)	10.0
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	143
Invert Level (m)	2.878
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1200

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	1.200	10.0
Flush-Flo™	0.357	10.0
Kick-Flo®	0.778	8.2
Mean Flow over Head Range	-	8.7

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	5.1	0.300	9.9	0.500	9.8	0.800	8.3
0.200	9.4	0.400	10.0	0.600	9.5	1.000	9.2

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Monarch House Barton Lane OX14 3NB		New Barn Lane, N.Bersted Surface Water Network 99 Unit Scheme						
Date 20/02/2019		Designed by S.Smith						
File 99 UNIT SCHEME +10%.MDX		Checked by						
Innovyze		Network 2017.1.2						
<u>Hydro-Brake® Optimum Manhole: SCPM1, DS/PN: S4.011, Volume (m³): 2.9</u>								
Depth (m) Flow (l/s)		Depth (m) Flow (l/s)		Depth (m) Flow (l/s)		Depth (m) Flow (l/s)		
1.200 10.0		2.400 13.9		5.000 19.7		8.000 24.7		
1.400 10.8		2.600 14.4		5.500 20.6		8.500 25.4		
1.600 11.5		3.000 15.4		6.000 21.5		9.000 26.1		
1.800 12.1		3.500 16.6		6.500 22.3		9.500 26.8		
2.000 12.7		4.000 17.7		7.000 23.2				
2.200 13.3		4.500 18.7		7.500 23.9				

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Storage Structures for Storm

Cellular Storage Manhole: S10, DS/PN: S3.000

Invert Level (m) 2.980 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	282.0	282.0	0.801	0.0	343.1
0.800	282.0	343.1			

Cellular Storage Manhole: S11, DS/PN: S1.009

Invert Level (m) 2.730 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	64.0	64.0	0.801	0.0	90.2
0.800	64.0	90.2			

Cellular Storage Manhole: SCPM3, DS/PN: S1.010

Invert Level (m) 2.675 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	60.0	60.0	0.801	0.0	85.6
0.800	60.0	85.6			

Tank or Pond Manhole: SHW2, DS/PN: S4.007

Invert Level (m) 3.547

Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)	Depth (m)	Area (m ²)
0.000	16.0	0.500	424.0	1.000	674.0	1.500	938.0
0.100	18.0	0.600	473.0	1.100	726.0	1.600	992.0
0.200	20.0	0.700	523.0	1.200	778.0	1.700	1048.0
0.300	22.0	0.800	572.0	1.300	830.0	1.800	1103.0
0.400	376.0	0.900	623.0	1.400	884.0	1.900	1159.0

Cellular Storage Manhole: S25, DS/PN: S4.010

Invert Level (m) 2.970 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.00000 Porosity 0.95
Infiltration Coefficient Side (m/hr) 0.00000

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Cellular Storage Manhole: S25, DS/PN: S4.010

Depth (m)	Area (m ²)	Inf. Area (m ²)	Depth (m)	Area (m ²)	Inf. Area (m ²)
0.000	360.0	360.0	0.801	0.0	433.6
0.800	360.0	433.6			

Time Area Diagram at Pipe Number S2.000 for Storm

Total Area (ha) 0.096

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.020	8	12 0.020	16	20 0.031
4	8 0.015	12	16 0.010		

Time Area Diagram at Pipe Number S4.002 for Storm

Total Area (ha) 0.100

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.020	8	12 0.020	16	20 0.030
4	8 0.015	12	16 0.015		

Time Area Diagram at Pipe Number S6.001 for Storm

Total Area (ha) 0.090

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.020	8	12 0.020	16	20 0.015
4	8 0.020	12	16 0.015		

Time Area Diagram at Pipe Number S7.000 for Storm

Total Area (ha) 0.090

Time (mins)	Area (ha)	Time (mins)	Area (ha)	Time (mins)	Area (ha)
From:	To:	From:	To:	From:	To:
0	4 0.020	8	12 0.020	16	20 0.030
4	8 0.010	12	16 0.010		

Time Area Diagram at Pipe Number S6.003 for Storm

Total Area (ha) 0.139

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Innovyze	Network 2017.1.2																																																	
<u>Time Area Diagram at Pipe Number S6.003 for Storm</u> <table><tr><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th></tr><tr><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th></tr><tr><td>0 4 0.025</td><td>8 12 0.025</td><td>16 20 0.029</td><td></td><td></td><td></td></tr><tr><td>4 8 0.030</td><td>12 16 0.030</td><td></td><td></td><td></td><td></td></tr></table> <u>Time Area Diagram at Pipe Number S6.004 for Storm</u> Total Area (ha) 0.132 <table><tr><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th><th>Time (mins)</th><th>Area</th></tr><tr><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th><th>From: To: (ha)</th></tr><tr><td>0 4 0.025</td><td>8 12 0.025</td><td>16 20 0.032</td><td></td><td></td><td></td></tr><tr><td>4 8 0.025</td><td>12 16 0.025</td><td></td><td></td><td></td><td></td></tr></table>			Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	0 4 0.025	8 12 0.025	16 20 0.029				4 8 0.030	12 16 0.030					Time (mins)	Area	Time (mins)	Area	Time (mins)	Area	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	0 4 0.025	8 12 0.025	16 20 0.032				4 8 0.025	12 16 0.025				
Time (mins)	Area	Time (mins)	Area	Time (mins)	Area																																													
From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)																																													
0 4 0.025	8 12 0.025	16 20 0.029																																																
4 8 0.030	12 16 0.030																																																	
Time (mins)	Area	Time (mins)	Area	Time (mins)	Area																																													
From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)	From: To: (ha)																																													
0 4 0.025	8 12 0.025	16 20 0.032																																																
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Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
Hot Start Level (mm) 0 Inlet Coefficient 0.800
Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 5
Number of Online Controls 3 Number of Time/Area Diagrams 6
Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350
Region England and Wales Cv (Summer) 0.750
M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
Analysis Timestep 2.5 Second Increment (Extended)
DTS Status ON
DVD Status ON
Inertia Status ON

Profile(s) Summer and Winter
Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years) 1, 30, 100
Climate Change (%) 0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S24	15 Winter	1	+0%	100/15 Summer				3.712
S1.001	S23	15 Winter	1	+0%	100/15 Summer				3.621
S1.002	S22	15 Winter	1	+0%	100/15 Summer				3.569
S1.003	S21	15 Winter	1	+0%	100/15 Summer				3.448
S1.004	S20	15 Winter	1	+0%	100/15 Summer				3.348
S2.000	S25	30 Winter	1	+0%	100/15 Summer				3.327
S1.005	S19	15 Winter	1	+0%	100/15 Summer				3.171
S1.006	S18	15 Winter	1	+0%	100/15 Summer				3.124
S1.007	S17	15 Winter	1	+0%	100/15 Summer				3.054
S3.000	S10	240 Winter	1	+0%	100/240 Winter				3.003
S1.008	S16	180 Winter	1	+0%	30/180 Winter				3.005
S1.009	S11	180 Winter	1	+0%	30/60 Summer				3.003
S1.010	SCPM3	180 Winter	1	+0%	1/15 Summer				3.001
S4.000	S14	15 Winter	1	+0%	100/15 Summer				4.319
S4.001	S13	15 Winter	1	+0%	100/15 Summer				4.178
S4.002	S12	15 Winter	1	+0%	30/15 Winter				4.047
S4.003	S11	120 Winter	1	+0%	30/15 Summer				3.966
S5.000	S15	15 Winter	1	+0%	30/60 Winter				4.008

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Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S1.000	S24	-0.172	0.000	0.12	4.7	OK	
S1.001	S23	-0.165	0.000	0.16	5.3	OK	
S1.002	S22	-0.147	0.000	0.26	8.3	OK	
S1.003	S21	-0.217	0.000	0.17	10.8	OK	
S1.004	S20	-0.183	0.000	0.32	20.5	OK	
S2.000	S25	-0.169	0.000	0.14	5.1	OK	
S1.005	S19	-0.224	0.000	0.33	30.7	OK	
S1.006	S18	-0.220	0.000	0.34	33.4	OK	
S1.007	S17	-0.210	0.000	0.39	37.9	OK	
S3.000	S10	-0.577	0.000	0.00	1.8	OK	
S1.008	S16	-0.190	0.000	0.18	15.8	OK	
S1.009	S11	-0.102	0.000	0.11	9.5	OK	
S1.010	SCPM3	0.151	0.000	0.10	3.0	SURCHARGED	
S4.000	S14	-0.156	0.000	0.20	6.9	OK	
S4.001	S13	-0.227	0.000	0.13	8.4	OK	
S4.002	S12	-0.212	0.000	0.19	12.1	OK	
S4.003	S11	-0.151	0.000	0.15	9.0	OK	
S5.000	S15	-0.187	0.000	0.06	2.4	OK	

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<u>1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)</u> <u>for Storm</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	
S4.004	S10	180 Winter	1	+0%	30/15 Summer				
S4.005	S29	180 Winter	1	+0%	30/15 Summer				
S4.006	SHW1	180 Winter	1	+0%	30/15 Summer				
S4.007	SHW2	180 Winter	1	+0%	1/15 Summer				
S4.008	S31/CPM2	180 Winter	1	+0%	1/15 Summer				
S4.009	S9	180 Winter	1	+0%	100/30 Summer				
S6.000	S7	15 Winter	1	+0%	100/15 Summer				
S6.001	S6	15 Winter	1	+0%	100/15 Summer				
S6.002	S5	15 Winter	1	+0%	100/15 Summer				
S7.000	S8	30 Winter	1	+0%	100/15 Summer				
S6.003	S4	30 Winter	1	+0%	30/15 Winter				
S6.004	S3	30 Winter	1	+0%	30/15 Summer				
S8.000	S2A	15 Winter	1	+0%	100/60 Winter				
S8.001	S2	15 Winter	1	+0%	100/30 Winter				
S6.005	S1	30 Winter	1	+0%	100/15 Winter				
S6.006	S32	30 Winter	1	+0%	100/120 Winter				
S4.010	S25	180 Winter	1	+0%	30/60 Summer				
S4.011	SCPM1	180 Winter	1	+0%	30/15 Winter				
S4.012	S26	180 Winter	1	+0%					
S4.013	S7954	180 Winter	1	+0%					
S4.014	S27	180 Winter	1	+0%					
S4.015	S28	180 Winter	1	+0%					
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Innovyze	Network 2017.1.2	

1 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Water Surcharged		Flooded		Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S4.014	S27	2.614	-0.376	0.000	0.06		9.6	OK	
S4.015	S28	2.445	-0.365	0.000	0.08		9.6	OK	

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Innovyze Network 2017.1.2		

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

Simulation Criteria

Areal Reduction Factor 1.000 Additional Flow - % of Total Flow 0.000
 Hot Start (mins) 0 MADD Factor * 10m³/ha Storage 2.000
 Hot Start Level (mm) 0 Inlet Coefficient 0.800
 Manhole Headloss Coeff (Global) 0.500 Flow per Person per Day (l/per/day) 0.000
 Foul Sewage per hectare (l/s) 0.000

Number of Input Hydrographs 0 Number of Storage Structures 5
 Number of Online Controls 3 Number of Time/Area Diagrams 6
 Number of Offline Controls 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model FSR Ratio R 0.350
 Region England and Wales Cv (Summer) 0.750
 M5-60 (mm) 19.000 Cv (Winter) 0.840

Margin for Flood Risk Warning (mm) 300.0
 Analysis Timestep 2.5 Second Increment (Extended)
 DTS Status ON
 DVD Status ON
 Inertia Status ON

Profile(s) Summer and Winter
 Duration(s) (mins) 15, 30, 60, 120, 180, 240, 360, 480, 600,
 720, 960, 1440, 2160, 2880, 4320
 Return Period(s) (years) 1, 30, 100
 Climate Change (%) 0, 0, 40

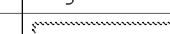
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S24	15 Winter	30	+0%	100/15 Summer				3.744
S1.001	S23	15 Winter	30	+0%	100/15 Summer				3.665
S1.002	S22	15 Winter	30	+0%	100/15 Summer				3.632
S1.003	S21	15 Winter	30	+0%	100/15 Summer				3.517
S1.004	S20	15 Winter	30	+0%	100/15 Summer				3.460
S2.000	S25	30 Winter	30	+0%	100/15 Summer				3.363
S1.005	S19	15 Winter	30	+0%	100/15 Summer				3.330
S1.006	S18	15 Winter	30	+0%	100/15 Summer				3.287
S1.007	S17	360 Winter	30	+0%	100/15 Summer				3.230
S3.000	S10	360 Winter	30	+0%	100/240 Winter				3.228
S1.008	S16	360 Winter	30	+0%	30/180 Winter				3.228
S1.009	S11	360 Winter	30	+0%	30/60 Summer				3.226
S1.010	SCPM3	360 Winter	30	+0%	1/15 Summer				3.224
S4.000	S14	15 Winter	30	+0%	100/15 Summer				4.364
S4.001	S13	30 Winter	30	+0%	100/15 Summer				4.330
S4.002	S12	30 Winter	30	+0%	30/15 Winter				4.317
S4.003	S11	60 Winter	30	+0%	30/15 Summer				4.283
S5.000	S15	60 Winter	30	+0%	30/60 Winter				4.221

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Innovyze	Network 2017.1.2	

30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S1.000	S24	-0.140	0.000	0.30	11.4	OK	
S1.001	S23	-0.121	0.000	0.39	13.2	OK	
S1.002	S22	-0.084	0.000	0.69	22.0	OK	
S1.003	S21	-0.148	0.000	0.47	29.9	OK	
S1.004	S20	-0.071	0.000	0.91	58.1	OK	
S2.000	S25	-0.133	0.000	0.35	12.6	OK	
S1.005	S19	-0.065	0.000	0.88	81.7	OK	
S1.006	S18	-0.057	0.000	0.88	86.6	OK	
S1.007	S17	-0.034	0.000	0.21	20.6	OK	
S3.000	S10	-0.352	0.000	0.00	1.9	OK	
S1.008	S16	0.033	0.000	0.17	14.9	SURCHARGED	
S1.009	S11	0.121	0.000	0.10	8.4	SURCHARGED	
S1.010	SCPM3	0.374	0.000	0.10	3.0	SURCHARGED	
S4.000	S14	-0.111	0.000	0.50	16.9	OK	
S4.001	S13	-0.075	0.000	0.26	16.8	OK	
S4.002	S12	0.058	0.000	0.35	22.4	SURCHARGED	
S4.003	S11	0.166	0.000	0.44	26.9	SURCHARGED	
S5.000	S15	0.026	0.000	0.08	2.8	SURCHARGED	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.
S4.004	S10	60 Winter	30	+0%	30/15 Summer			
S4.005	S29	60 Winter	30	+0%	30/15 Summer			
S4.006	SHW1	240 Winter	30	+0%	30/15 Summer			
S4.007	SHW2	240 Winter	30	+0%	1/15 Summer			
S4.008	S31/CPM2	240 Winter	30	+0%	1/15 Summer			
S4.009	S9	180 Winter	30	+0%	100/30 Summer			
S6.000	S7	15 Winter	30	+0%	100/15 Summer			
S6.001	S6	15 Winter	30	+0%	100/15 Summer			
S6.002	S5	30 Winter	30	+0%	100/15 Summer			
S7.000	S8	30 Winter	30	+0%	100/15 Summer			
S6.003	S4	30 Winter	30	+0%	30/15 Winter			
S6.004	S3	30 Winter	30	+0%	30/15 Summer			
S8.000	S2A	15 Winter	30	+0%	100/60 Winter			
S8.001	S2	15 Winter	30	+0%	100/30 Winter			
S6.005	S1	30 Winter	30	+0%	100/15 Winter			
S6.006	S32	180 Winter	30	+0%	100/120 Winter			
S4.010	S25	180 Winter	30	+0%	30/60 Summer			
S4.011	SCPM1	180 Winter	30	+0%	30/15 Winter			
S4.012	S26	720 Winter	30	+0%				
S4.013	S7954	720 Winter	30	+0%				
S4.014	S27	720 Winter	30	+0%				
S4.015	S28	720 Winter	30	+0%				

PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Pipe Flow / Overflow Cap. (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.004	S10	4.219	0.180	0.000	0.76	35.9	SURCHARGED	
S4.005	S29	4.161	0.138	0.000	0.74	35.8	SURCHARGED	
S4.006	SHW1	4.116	0.109	0.000	0.32	18.8	SURCHARGED	
S4.007	SHW2	4.112	0.265	0.000	0.04	4.6	SURCHARGED	
S4.008	S31/CPM2	4.117	0.441	0.000	0.04	3.0	SURCHARGED	
S4.009	S9	3.394	-0.056	0.000	0.03	3.2	OK	
S6.000	S7	4.122	-0.121	0.000	0.43	15.2	OK	
S6.001	S6	3.967	-0.171	0.000	0.38	25.1	OK	
S6.002	S5	3.902	-0.032	0.000	0.61	38.4	OK	
S7.000	S8	3.928	-0.138	0.000	0.32	12.1	OK	
S6.003	S4	3.843	0.027	0.000	0.91	59.5	SURCHARGED	
S6.004	S3	3.708	0.054	0.000	1.41	77.5	SURCHARGED	
S8.000	S2A	3.611	-0.172	0.000	0.09	2.8	OK	
S8.001	S2	3.597	-0.134	0.000	0.34	11.5	OK	
S6.005	S1	3.512	-0.116	0.000	0.69	81.8	OK	
S6.006	S32	3.391	-0.315	0.000	0.05	46.3	OK	
S4.010	S25	3.391	0.121	0.000	0.14	10.8	SURCHARGED	
S4.011	SCPM1	3.400	0.222	0.000	0.15	10.0	SURCHARGED	
S4.012	S26	2.877	-0.219	0.000	0.16	10.0	OK	
S4.013	S7954	2.671	-0.369	0.000	0.07	10.0	OK	

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30 year Return Period Summary of Critical Results by Maximum Level (Rank 1)
for Storm

PN	US/MH Name	Water Surcharged		Flooded		Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S4.014	S27	2.615	-0.375	0.000	0.07		10.0	OK	
S4.015	S28	2.447	-0.363	0.000	0.08		10.0	OK	

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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

Simulation Criteria

Areal Reduction Factor	1.000	Additional Flow - % of Total Flow	0.000
Hot Start (mins)	0	MADD Factor * 10m³/ha Storage	2.000
Hot Start Level (mm)	0	Inlet Coefficient	0.800
Manhole Headloss Coeff (Global)	0.500	Flow per Person per Day (l/per/day)	0.000
Foul Sewage per hectare (l/s)	0.000		

Number of Input Hydrographs	0	Number of Storage Structures	5
Number of Online Controls	3	Number of Time/Area Diagrams	6
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.350
Region England and Wales Cv (Summer)			0.750
M5-60 (mm)	19.000	Cv (Winter)	0.840

Margin for Flood Risk Warning (mm)	300.0
Analysis Timestep	2.5 Second Increment (Extended)
DTS Status	ON
DVD Status	ON
Inertia Status	ON

Profile(s)	Summer and Winter
Duration(s) (mins)	15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440, 2160, 2880, 4320
Return Period(s) (years)	1, 30, 100
Climate Change (%)	0, 0, 40

PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surge	First (Y) Flood	First (Z) Overflow	Overflow Act.	Water Level (m)
S1.000	S24	15 Winter	100	+40%	100/15 Summer				4.215
S1.001	S23	15 Winter	100	+40%	100/15 Summer				4.157
S1.002	S22	15 Winter	100	+40%	100/15 Summer				4.098
S1.003	S21	15 Winter	100	+40%	100/15 Summer				4.024
S1.004	S20	15 Winter	100	+40%	100/15 Summer				3.940
S2.000	S25	15 Winter	100	+40%	100/15 Summer				3.722
S1.005	S19	600 Winter	100	+40%	100/15 Summer				3.743
S1.006	S18	480 Winter	100	+40%	100/15 Summer				3.748
S1.007	S17	600 Winter	100	+40%	100/15 Summer				3.759
S3.000	S10	600 Winter	100	+40%	100/240 Winter				3.688
S1.008	S16	600 Winter	100	+40%	30/180 Winter				3.830
S1.009	S11	720 Winter	100	+40%	30/60 Summer				3.997
S1.010	SCPM3	720 Winter	100	+40%	1/15 Summer				4.045
S4.000	S14	15 Winter	100	+40%	100/15 Summer				4.885
S4.001	S13	30 Winter	100	+40%	100/15 Summer				4.829
S4.002	S12	30 Winter	100	+40%	30/15 Winter				4.759
S4.003	S11	30 Winter	100	+40%	30/15 Summer				4.673
S5.000	S15	30 Winter	100	+40%	30/60 Winter				4.604

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100 year Return Period Summary of Critical Results by Maximum Level (Rank
1) for Storm

PN	US/MH Name	Surcharged Flooded		Pipe		Status	Level Exceeded
		Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)		
S1.000	S24	0.331	0.000	0.49	18.3	SURCHARGED	
S1.001	S23	0.371	0.000	0.64	21.8	SURCHARGED	
S1.002	S22	0.382	0.000	1.06	33.6	SURCHARGED	
S1.003	S21	0.359	0.000	0.69	44.1	SURCHARGED	
S1.004	S20	0.409	0.000	1.31	83.9	SURCHARGED	
S2.000	S25	0.226	0.000	0.61	21.7	SURCHARGED	
S1.005	S19	0.348	0.000	0.23	20.8	SURCHARGED	
S1.006	S18	0.404	0.000	0.26	26.1	SURCHARGED	
S1.007	S17	0.495	0.000	0.26	25.2	SURCHARGED	
S3.000	S10	0.108	0.000	0.04	41.7	SURCHARGED	
S1.008	S16	0.635	0.000	0.45	39.0	SURCHARGED	
S1.009	S11	0.892	0.000	0.18	15.7	SURCHARGED	
S1.010	SCPM3	1.195	0.000	0.11	3.3	SURCHARGED	
S4.000	S14	0.410	0.000	0.82	27.8	SURCHARGED	
S4.001	S13	0.424	0.000	0.38	24.5	SURCHARGED	
S4.002	S12	0.500	0.000	0.72	46.7	SURCHARGED	
S4.003	S11	0.556	0.000	1.02	62.2	SURCHARGED	
S5.000	S15	0.409	0.000	0.17	6.3	SURCHARGED	

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<u>100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm</u>									
PN	US/MH Name	Storm	Return Period	Climate Change	First (X) Surcharge	First (Y) Flood	First (Z) Overflow	Overflow Act.	
S4.004	S10	30 Winter	100	+40%	30/15 Summer				
S4.005	S29	30 Winter	100	+40%	30/15 Summer				
S4.006	SHW1	480 Winter	100	+40%	30/15 Summer				
S4.007	SHW2	480 Winter	100	+40%	1/15 Summer				
S4.008	S31/CPM2	480 Winter	100	+40%	1/15 Summer				
S4.009	S9	240 Winter	100	+40%	100/30 Summer				
S6.000	S7	30 Winter	100	+40%	100/15 Summer				
S6.001	S6	30 Winter	100	+40%	100/15 Summer				
S6.002	S5	30 Winter	100	+40%	100/15 Summer				
S7.000	S8	30 Winter	100	+40%	100/15 Summer				
S6.003	S4	30 Winter	100	+40%	30/15 Winter				
S6.004	S3	240 Winter	100	+40%	30/15 Summer				
S8.000	S2A	240 Winter	100	+40%	100/60 Winter				
S8.001	S2	240 Winter	100	+40%	100/30 Winter				
S6.005	S1	240 Winter	100	+40%	100/15 Winter				
S6.006	S32	240 Winter	100	+40%	100/120 Winter				
S4.010	S25	240 Winter	100	+40%	30/60 Summer				
S4.011	SCPM1	240 Winter	100	+40%	30/15 Winter				
S4.012	S26	240 Winter	100	+40%					
S4.013	S7954	240 Winter	100	+40%					
S4.014	S27	240 Winter	100	+40%					
S4.015	S28	240 Winter	100	+40%					
PN	US/MH Name	Water Level (m)	Surcharged Depth (m)	Flooded Volume (m³)	Flow / Cap.	Overflow (l/s)	Pipe Flow (l/s)	Status	Level Exceeded
S4.004	S10	4.590	0.551	0.000	1.81		85.8	SURCHARGED	
S4.005	S29	4.474	0.451	0.000	1.76		85.4	SURCHARGED	
S4.006	SHW1	4.363	0.356	0.000	0.33		19.6	SURCHARGED	
S4.007	SHW2	4.360	0.513	0.000	0.04		4.4	SURCHARGED	
S4.008	S31/CPM2	4.364	0.688	0.000	0.04		3.2	SURCHARGED	
S4.009	S9	4.358	0.908	0.000	0.03		2.9	SURCHARGED	
S6.000	S7	4.621	0.378	0.000	0.62		21.9	SURCHARGED	
S6.001	S6	4.600	0.462	0.000	0.53		35.2	SURCHARGED	
S6.002	S5	4.510	0.576	0.000	0.91		57.2	SURCHARGED	
S7.000	S8	4.498	0.432	0.000	0.64		24.1	SURCHARGED	
S6.003	S4	4.426	0.610	0.000	1.60		103.7	SURCHARGED	
S6.004	S3	4.372	0.717	0.000	1.20		66.0	SURCHARGED	
S8.000	S2A	4.370	0.587	0.000	0.03		1.1	FLOOD RISK	
S8.001	S2	4.369	0.638	0.000	0.13		4.2	FLOOD RISK	
S6.005	S1	4.368	0.740	0.000	0.59		69.3	SURCHARGED	
S6.006	S32	4.360	0.654	0.000	0.07		68.7	SURCHARGED	
S4.010	S25	4.359	1.089	0.000	0.16		11.8	SURCHARGED	
S4.011	SCPM1	4.349	1.171	0.000	0.16		11.0	SURCHARGED	
S4.012	S26	2.882	-0.214	0.000	0.18		11.0	OK	
S4.013	S7954	2.676	-0.364	0.000	0.08		11.0	OK	
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100 year Return Period Summary of Critical Results by Maximum Level (Rank 1) for Storm

PN	US/MH Name	Water Surcharged		Flooded		Pipe		Status	Level Exceeded
		Level (m)	Depth (m)	Volume (m³)	Flow / Cap.	Overflow (l/s)	Flow (l/s)		
S4.014	S27	2.620	-0.370	0.000	0.07		11.0	OK	
S4.015	S28	2.452	-0.358	0.000	0.09		11.0	OK	